IN THE US PATENT & TRADEMARK OFFICE

APPLICANT: Martin BURGBACHER
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FOR: STATOR ASSEMBLY
EXAMINER: DANG LE ART UNIT: 2834

AMENDMENT IN RESPONSE TO FIRST ACTION OF 21 MAR. 2006

Commissioner of Patents JUNE 20, 2006
PO BOX 1450
ALEXANDRIA VA 22313-1450
Sir:

Responsive to the First Action of 21 MAR. 2006,
the term for response to which expires 21 JUN. 2006,
please amend as follows:
IN THE ABSTRACT:
Please substitute the attached amended text, shortened to 150 words.

ABSTRACT OF THE DISCLOSURE

A stator assembly (20) has a plurality of splayed stator poles (31-36). ~~, divisible by six, with first (31) through sixth (36) poles being arranged successively within a predetermined angular range. Three winding phases (70, 72, 74) are arranged in delta configuration. For their connection, three current rails (U, V, W, 38, 40, 42) are provided.~~ A first winding coil (51) is arranged on the first stator pole (31) between a first current rail (38) and the second current rail (40), the second winding coil (52) is arranged on the second stator pole (32) between the second current rail (40) rails and the third current rail (42), the third winding coil (53) is arranged on the third stator pole (33) between the third current rail (42) and the first current rail (38), the fourth winding coil (54) is arranged on the fourth stator pole (34) between the first current rail (38) and the second current rail (40), the fifth winding coil (55) is arranged on the fifth stator pole (35) between the second current rail (40) and the third current rail (42), and the sixth winding coil (56) is arranged on the sixth stator pole (36) between the third current rail (42) and the first current rail (38). ~~Preferably, all the winding coils are continuously wound, without interrupting the winding wire (44).~~

IN THE CLAIMS:

1. (Currently Amended) A stator assembly having a plurality of stator poles (31-36), said plurality being divisible by six,

a first (31), a second (32), a third (33), a fourth (34), a fifth (35) and a sixth (36) of said stator poles being arranged successively within a predetermined angular range;

three winding phases (70, 72, 74) connected in a delta configuration;

three respective current rails (U, V, W, 38, 40, 42) associated with respective ones of said winding phases for their connection;

wherein

a first winding coil (51) is arranged on said first stator pole (31) and electrically connected between a first one (38) of said current rails and a second one (40) of said current rails;

a second winding coil (52) is arranged on said second stator pole (32) and electrically connected between said second current rail (40) of said current rails and a third one (42) of said current rails;

a third winding coil (53) is arranged on said third stator pole (33) and electrically connected between said third current rail (42) and said first current rail (38);

a fourth winding coil (54) is arranged on said fourth stator pole (34) and electrically connected between said first current rail (38) and said second current rail (40);

a fifth winding coil (55) is arranged on said fifth stator pole (35) and electrically connected between said second current rail (40) and said third current rail (42); and

a sixth winding coil (56) is arranged on said sixth stator pole (36) and electrically connected between said third current rail (42) and said first current rail (38).

2. (Original) The stator assembly of claim 1, wherein

at least two successive winding coils (51, 52) are continuously wound and at their interface (61) are electrically connected to an associated current rail (40) without interrupting their winding wire (44).

3. (Original) The stator assembly of claim 2, wherein

the winding coils of the first through sixth winding coils are continuously wound and are electrically connected at their respective interfaces (61-65) to respective current rails, without interrupting their winding wires.

4. (Presently Amended) The stator assembly according to claim 1, wherein

at least one of said current rails (38, 40, 42) is configured to electrically interconnect a plurality of interface points (61, 64), said interface points being separated by three intervening stator poles.

5. (Previously Presented) The stator assembly according to claim 1, wherein there are three stator poles per pole pair of the rotor (22).

6. (Previously Presented) The stator assembly according to claim 1, wherein

said current rails (38, 40, 42) are embedded within an insulating body (44) and are, except for terminals (A-F, U, V, W) of said rails, substantially completely enclosed by said body.

7. (Original) The stator assembly according to claim 6, wherein,

at a terminating point (A-F, U, V, W), a respective terminal (A, 43) projects out of the insulating body (44).

8. (Currently Amended) The stator assembly according to claim 6, wherein a terminal (U, V, W) is electrically connected with a circuit board (47) which is arranged adjacent an outer face of the stator assembly (20).

9. (Currently Amended) The stator assembly according to claim 8, further comprising at least one power semiconductor (48) provided on said circuit board (47) for controlling current in a phase (70, 72, 74) of the stator windings phases (45).

10. (Currently Amended) An electronically commutated DC motor having a stator assembly ~~according to claim 1,~~ with a plurality of stator poles (31-36), said plurality being divisible by six,

a first (31), a second (32), a third (33), a fourth (34), a fifth (35) and a sixth (36) of said stator poles being arranged successively within a predetermined angular range;

three winding phases (70, 72, 74) connected in a delta configuration;

three respective current rails (U, V, W, 38, 40, 42) associated with respective ones of said winding phases for their connection;

wherein

a first winding coil (51) is arranged on said first stator pole (31) and electrically connected between a first one (38) of said current rails and a second one (40) of said current rails;

a second winding coil (52) is arranged on said second stator pole (32) and electrically connected between said second current rail (40) of said current rails and a third one (42) of said current rails;

a third winding coil (53) is arranged on said third stator pole (33) and electrically connected between said third current rail (42) and said first current rail (38);

a fourth winding coil (54) is arranged on said fourth stator pole (34) and electrically connected between said first current rail (38) and said second current rail (40);

a fifth winding coil (55) is arranged on said fifth stator pole (35) and electrically connected between said second current rail (40) and said third current rail (42); and

a sixth winding coil (56) is arranged on said sixth stator pole (36) and electrically connected between said third current rail (42) and said first current rail (38);

and a permanent magnet rotor (22), wherein said stator assembly (20) has three stator poles for each pole pair of said rotor (22).

REMARKS

Applicant acknowledges receipt of the First Action of 21 MAR. 2006 and requests reconsideration of the claims as amended. Main claim 1 has been amended to highlight the inventive concept and dependent claim 10 has been rewritten in independent form.

ART REJECTION-SECTION 102

Claims 1 & 6 were rejected as anticipated by LUTKENHAUS USP 6,177,741, alleged to show winding phases connected in a DELTA configuration. In fact, LUTKENHAUS shows winding phases connected in a STAR configuration, as stated at col. 1, line 32. Thus, the premise of the section 102 rejection is incorrect.

This star-configured circuit has a star-point connector 16 which is located under the LUTKENHAUS circuit board 8 and is thus only visible in section in his FIG. 1. This star connection has three tabs 17 (col. 3, line 22) which each connect to a respective end of one of the coils W2, W4, W6. This is the star-point or ground connection of the LUTKENHAUS motor. The other end of coil W2 is connected via RAIL B with one end of coil W5, and this in turn is connected via a tab 23 (col. 3, line 24) which is designated 22U on the enclosed explanatory marked-up version of the LUTKENHAUS FIG. 3. A corresponding schematic of the winding phases has been added, below and to the right of FIG. 3.

Analogously, coil W4 is connected via RAIL A with one end of coil W1, whose other end is connected via a tab 23 with the socket designated 22V.

Analogously, coil W6 is connected via RAIL C with one end of coil W3, whose other end is connected via a tab 23 with the socket designated 22W.

This LUTKENHAUS structure is a star circuit, in which two coils are always connected in series, well adapted for operation

at high voltage.

By contrast, the present claims recite a delta circuit, in which two coils are always connected in parallel, e.g. FIG. 4 which shows coils 53 and 54 connected in parallel. This is a circuit well adapted for operation at low voltages, e.g. for operation coupled to an auto battery, in which the winding must have a very low resistance, so that high currents can flow and can, despite the low voltage, generate a high torque output.

The Office has apparently interpreted present claim 1 "topologically" in an attempt to "read it" on LUTKENHAUS. If one looks at LUTKENHAUS FIG. 3, coil W1 lies (topologically) between RAIL A and RAIL B. However, it also lies topologically between RAIL C and RAIL B. Finally, it also lies between RAIL C and RAIL A. Clearly, this makes no sense as an electrical description.

Claim 1 has been amended to add the words "and electrically connected" in each of several subparagraphs, in order to minimize ambiguity and guide the reader to the proper interpretation of the elements recited.

Page 3 of the Office Action inserted reference characters from the LUTKENHAUS structure into present claim 1, in an attempt to "read" the claim on LUTKENHAUS. Enclosed is a corrected mark-up of page 3, showing how a correct description of the LUTKENHAUS structure would read.

It should be apparent that the structure recited in claim 1 could not, in any way, have been derived from the LUTKENHAUS teachings. Rather, LUTKENHAUS leads in an entirely different direction, namely the serial connection of pairs of coils arranged in three radiating arms of a star configuration. Claims 1 and 10, as amended, clearly recite a novel structure, and dependent claims 2-9 incorporate the novel features by reference. Withdrawal of the section 102 rejection is solicited.

ART REJECTION-SECTION 103

Dependent claims 2 & 3 were rejected as obvious over a combination of LUTKENHAUS with LILL (USP 4,287,446). LILL is directed to a special kind of continuous winding of coils for a stepper motor, as shown for example in FIG. 9. There is little similarity to the structure of the present invention, which is immediately apparent from the fact that no current rails are shown. The international search report of 17 JUL. 2003 correctly designated this as a "category A" document, i.e. representing only "technological background." Nothing in LILL suggests the desirability of a combination with the LUTKENHAUS structure, nor would such a combination, even if possible, result in the structure recited in claims 1 and 10.

Paragraph 6 of the Office Action rejected claims 1 and 10 as obvious over a combination of LUTKENHAUS with VON DER HEIDE. Like LUTKENHAUS, VON DER HEIDE disclose a star-configured three-phase motor, in which two diametrically located coils are connected in series. For example, FIG. 1 shows coils 21 & 22 connected in series, coils 23 & 24 connected in series, and coils 25 & 26 connected in series. The VON DER HEIDE structure is highly similar to LUTKENHAUS, but neither of them has any relationship to the teachings of the present invention.

Paragraph 7 rejected claims 6-8 as obvious over a combination of LUTKENHAUS with BEST (USP 5,828,147).

BEST, a patent owned by the assignee of the present invention, discloses a three-phase motor with three current rails 12. The winding is implemented as a delta circuit (see FIG. 6) in which three coils are always connected in parallel. Clearly, the connection of these coils is different from that recited in claims 6-8, and the simple circuit structure recited in claim 1 could not have been derived from the BEST disclosure.

Since LUTKENHAUS teaches a **star** configuration while BEST teaches a **delta** configuration, there is no motivation to **try** to combine these disclosures, nor would this lead to the present invention.

Paragraph 8 of the Action rejected claim 9 as obvious over a combination of LUTKENHAUS, BEST and BOSCH. BOSCH was cited only as disclosing the feature of having a power semiconductor somewhere on a circuit board; in the International Search Report, Bosch was corrected designated as "category A" background info. Since BOSCH teaches none of the other features of the present invention, and, as previously stated, there is no motivation to combine the LUTKENHAUS star-configured circuit with the BEST delta-configured circuit, an engineer presented with the LUTKENHAUS, BEST and BOSCH disclosures would not be directed toward the structure recited in claim 1, much less the more specific structure recited in dependent claim 9. Reconsideration of the section 103 rejection of claim 9 is solicited.

The references disclose bits, pieces and individual elements also recited in the present claims, but completely fail to suggest the claimed combination of features.

The Federal Circuit noted in Ruiz v. A.B. Chance Co., 234 F.3rd 654, 57 USPQ 2d 1161 (2000) that "In order to prevent a hindsight-based obviousness analysis, we have clearly established that the relevant inquiry for determining the scope and content of the prior art is whether there is a reason, suggestion or motivation in the prior art or elsewhere that would have led one of ordinary skill in the art to combine the references." See also In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) and In re Paulsen, 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994).

CONCLUSION

In view of the foregoing amendments and arguments, it is respectfully submitted that independent claims 1 and 10, and their respective dependent claims, are now clear, and patentably distinguish over LUTKENHAUS, LILL, BEST, BOSCH, and the other art of record, and thus are now in condition for allowance.

If the examiner notes any remaining informalities which could be resolved by a telephone call, he is invited to telephone Applicant's counsel.

Respectfully submitted,

/Milton M. Oliver/

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Enc.: color mark-up of LUTKENHAUS FIG. 3, with added schematic
corrected mark-up version of pages 2-3 of the Office Action